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United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting property groups relating to one or several historic contexts. See instructions in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items

X New Submission _____ Amended Submission

A. Name of Multiple Property Listing

Montana's Historic Timber Stringer Bridges

B. Associated Historic Contexts

Timber and Log Stringer Bridge-building in Montana, 1860-1915;

The Montana Highway Department Takes Over, 1915-1930;

The Great Depression, 1931-1941;

World War II to the Interstate Era, 1942-1960.

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D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.
(_____ See continuation sheet for additional comments.)

Signature and title of certifying official | Date

State or Federal Agency or Tribal government

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Signature of the Keeper Date of Action

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Fill in page numbers for each section in the space below.

E. STATEMENT OF HISTORIC CONTEXTS

E. Statement of Historic Contexts

Timber and Log Stringer Bridge-building in Montana, 1860-1915

Army civil engineer John Mullan built the first timber bridges in Montana in 1860. In 1859, Mullan and a crew of 230 civilians and soldiers began construction of a 624-mile wagon road between Walla Walla, Washington and Fort Benton on the upper Missouri River. On the first hundred miles of the road east of the continental divide in western Montana, the company built 47 primitive log structures across the St. Regis-DeBorgia River; nearly all of them washed out during the spring run-off in 1861. The bridges were all simple structures, consisting of log stringers resting on log abutments. Mullan did not provide specific information on the decking of the structures. A contemporary photograph of one of the bridges does not show the decking. Mullan diligently replaced all the washed-out bridges and added a six-span structure across the Blackfoot River near present Missoula to the system during the winter of 1862.

> The stream had already become frozen at its edges; and when all the times were cut, hauled, hewn, and ready to be put together, we threw a boom across the river . . . By means of this boom we dammed up the floating ice, which in a single night became sufficiently frozen to allow horses to cross. Taking advantage of this ice, we cut an opening large enough to hold the piers and commenced their construction, sinking them, by means of rock placed in bottom . . . until they rested on the river bed. They were leveled by making a profile of the bottom and adjusting blocks under the larger set of ties. Rock for filling them was gathered from a bluff . . . on the left bank and by means of hand sleds run over the ice to the piers, were thus rapidly filled. Each was thus built and the entire framework and superstructure erected before the ice broke up. While this was being done, the whipsawyers were at work sawing out plank seventeen feet long and three inches thick . . . ; and by the 1st of March we had completed the entire bridge.

The Blackfoot River Bridge was an important component of the Mullan Military Road until 1868 when it washed out and temporarily replaced by a ferry. Although Mullan's bridges were simple timber stringer structures, their basic design was the model for the hundreds of timber stringer bridges that would be constructed in Montana over the next century.[1]

In July 1862, John White and five other prospectors discovered gold on Grasshopper Creek in southwestern Montana. The resulting stampede brought hundreds of newcomers into what had before been a sparsely settled area for Euro-Americans. Additional gold strikes in 1863 and 1864 caused even bigger stampedes to the region. By 1865, newly-established Montana Territory boasted a population of around 28,000 people. Transportation was critical to the prosperity of the new territory, so, in December 1864, the first territorial legislature licensed nearly two dozen companies to build toll roads and bridges. All of the bridges were log or hewn wood and none designed by an engineer. Surviving photographs of them show bridges not dissimilar in appearance to Mullan's bridges. Some, however, incorporated log king or queen post trusses into the design. It is unclear if the trusses served any structural function on the smaller timber bridges. Because not professionally designed, the bridges often failed or were in such poor condition that users frequently complained to the legislature about them. By 1872, user complaints and high tolls compelled the legislature to abolish the toll road system in Montana. The counties assumed control of the territory's roads and bridges and taxed their residents to maintain them. By the early 1880s, Montana was crisscrossed by a network of roads and timber bridges that were, for the most part, in deplorable condition. The remoteness of the territory, the nascent agricultural industry, and the decline of mining made the improvement of the system impractical until the territory could be connected to the rest of the country by a better and more reliable means of transportation – the railroads.[2]

The completion of the Utah and Northern Railroad in 1881, the Northern Pacific Railway in 1883, and the St. Paul, Minneapolis and Manitoba Railroad (later the Great Northern) in 1887 significantly changed the way Montanans did

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[1] Michael P. Malone, Richard B. Roeder, and William L. Lang, *Montana: A History of Two Centuries*, rev. ed. (Seattle: University of Washington Press, 1991), 72; John Mullan, *Report on the Construction of a Military Road from Fort Walla-Walla to Fort Benton*, (Washington DC: Government Printing Office, 1863), 12-13, 18.

[2] Jon Axline, *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956*, (Helena: Montana Historical Society Press, 2005), 14.

business and how its residents got around the territory. Instead of by road or steamboat as done previously, by the late 1880s most of the commercial freight moved through the state over one of those lines. The railroads caused Montana's road system to function more as farm-to-market routes that provided access to the railroads than as an inter- and intra-state system. Counties expended little on roads and bridges during this period. Eventually, however, good bridges would be critical to the economic prosperity of the territory. The railroads significantly changed Montana's transportation landscape and caused a profound change in the system by allowing the cheap importation of steel and other materials necessary for an evolving road network. The railroads caused a boom in vehicular steel bridge construction in the territory that began with the construction of a bridge over the Missouri River at Fort Benton. Constructed in 1888, the Fort Benton Bridge was the first all-steel bridge in Montana. The bridge (24CH335; listed 1980), which still stands, had a substantial impact on the economy of Fort Benton, a former river port that transitioned into a major agricultural trade community because of the bridge and the community's location on the Great Northern Railway.[3]

The Fort Benton bridge marked the beginning of a new era in bridge construction in Montana, one based on modern engineering principals and the use of structural steel rather than wood. Steel became the material of choice for bridges and the Northern Pacific and Great Northern railroads could easily haul it to Montana from fabrication plants in the East and Midwest. Along with prominent steel truss structures across major river crossings, Montana counties also continued to utilize simple timber bridges in addition to steel stringer and reinforced concrete bridges on important farm-to-market roads. The immigration of people to Montana after the completion of the railroads put pressure on the county governments to provide a modern infrastructure for their constituencies. Although steel bridges crossed the major river crossings, the counties still relied heavily on timber bridges. They were simple to construct, inexpensive, and could be constructed by people working off their annual road taxes.[4]

The counties built steel bridges at major river crossings in the late nineteenth and early twentieth centuries. The majority of county-built bridges, however, crossed smaller obstacles like streams and dry gullies. For those crossings, the counties built timber or steel stringer structures. Located primarily on farm-to-marker (or feeder) roads, the bridges were simple in design, utilitarian, and mostly constructed by county road crews. Timber bridges in eastern Montana were built of sawn wood components tailored to individual building sites. There was no standardized design. Instead the bridges were designed by County Surveyors and built from materials acquired at local lumberyards. In western Montana, however, building materials were often obtained from near the construction site. Photographs of county-built bridges in northwestern Montana during this period show log stringer or log King and Queen post truss bridges. All of the wood components from Montana were of untreated timber (no preservatives) and had limited service life before they were replaced by either another log or timber structure or a steel bridge.[5]

The counties maintained funds specifically for bridge maintenance and construction. They obtained the money from annual road taxes levied against the property owners. If the county's funds included enough money, the bridge would be paid directly out of that source. Oftentimes, however, and especially with substantial steel truss bridges, the cost exceeded the amount available in the Bridge Funds. In those instances, the county commissioners called for bond elections to raise money for the projects. For the most part, however, timber bridges were not substantial structures and could easily be financed through the counties' bridge funds[6].

The Montana Highway Department Takes Over, 1915-1930

The Thirteenth Legislature's creation of the State Highway Commission in March 1913 caused a profound change in Montana's transportation landscape. The commission resulted from many years' lobbying by state good roads groups to

[3] Fredric L. Quivik, *Historic Bridges of Montana*, (Washington DC: National Park Service, 1982), 24, 27.

[4] The counties assessed an annual road tax on its property-owning residents. The property owner could either pay the tax or work it off by doing a specified amount of road or bridge work during the year. Fredric L. Quivik, "Montana's Minneapolis Bridge Builders," *IA: The Journal of the Society for Industrial Archeology*, 10 (1984), 39, 42; George R. Metlen, *Report of the Montana State Highway Commission for the Years 1915-1916*, (Helena: State Highway Commission, 1916), 4-5.

[5] Jon Axline, *Monuments Above the Water: Montana's Historic Highway Bridges, 1860-1956*, (Helena: Montana Department of Transportation, 1993), 26-27.

[6] Axline, *Conveniences Sorely Needed,* 142 n2.

develop engineering standards for roads and impose order on the bridge-building industry. Importantly, the Congress's impending passage of the first Federal Aid Road Act in 1914 made it mandatory that the states establish state highway commissions to manage the federal funds. When formed in March 1913, the highway commission consisted of three civil engineers appointed to the position by the governor. At first, the commission served only as an advisory body that provided information on modern road construction techniques to the state's counties. It published pamphlets, developed a statewide highway map, and met with local governments about their transportation needs. Even with the state's increased influence on road and bridges matters, the counties still followed the old system of advertising and letting contracts for new bridges because there was no state money available to them for construction.[7]

In March 1915, the Montana legislature mandated that the highway commission form a bridge department. The highway commissioners hired Utah engineer Charles A. Kyle to head it up because of his extensive experience in the design and construction of steel bridges. Over the next month, the commissioners and Kyle hammered out the details of Montana's new bridge-building system, which included guidelines for letting contracts and distribution of standardized bid sheets to all the counties. Kyle also devised standardized designs for timber, steel truss, reinforced concrete, and steel stringer bridges. Although these bridge plans were housed at the county courthouses, the commission required contractors to obtain final plans from the bridge department in Helena to ensure that the contractors built the bridge to the specifications defined in the standard plans. The counties remained responsible for letting the contracts and paying for the structure. The state, however, supervised the construction and inspected the bridges before authorizing payments to the contractors.[8]

By the end of its first year, the commission's bridge department worked through the procedural details of its new system and regularly provided bridge plans to the counties. The commission promoted Kyle to Chief Bridge Engineer and authorized him to hire "competent engineers to supervise the construction of new … bridges" in the state. Indeed, by the end of 1915, Kyle and his assistants oversaw the counties' construction of nearly seventy steel bridges in the state, including timber bridges in Big Horn, Carbon, Phillips, and Sheridan counties. Although the Alkali Creek bridge in Phillips County consisted of eight sixteen-foot spans for a total length of 128 feet, the commission's bridge engineers designed them to span crossings of from 32 to 45 feet. None of those original timber bridges have survived. The basic standard timber bridge design developed in 1915 would not dramatically change for the next 45 years. Timber bridges consisted simply of pre-cut sawn-wood components. The bridge ends rested on earthen abutments with wood backwalls braced by wood pilings. The stringers were supported by either simple pile bents or by trestle-type bents. Before 1930, the stringers consisted of twelve lines of 4' x 16" timber beams. After 1930, the stringers consisted of 6" x 18" or 8" x 18" timbers. Bridge decks were constructed on laminated wood two-by-fours with a gravel or asphalt overlay. The highway commission designed the bridges to support a moving 15-ton vehicle with two-thirds of its weight resting on the rear axle (an H-15 loading). The timber decks were flanked by low wood curbs with scupper-type drains and the guardrails were double-coursed and supported by wood posts bolted to the outside stringers. The first timber bridges designed by the highway commission were not treated with preservatives.[9]

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[7] Montana State Highway Commission Meeting Minutes, Book 1, 13-15, 67; *Laws, Resolutions, and Memorials of the State of Montana Passed by the Thirteenth Regular Session of the Legislative Assembly*, (Helena: State Publishing Co., 1913), 318-326; M. J. Steere, *History of the Montana State Highway Department, 1913-1942*, (Helena: State Highway Commission, 1943), 9-12.

[8] Little is known about Charles A. Kyle. Born in Canada in January 1864, he immigrated to the United States with his family in 1869. By 1900, he had married and was working as a civil engineer in Chicago. In May 1915, he ienquired about a new position as the bridge engineer for the Montana State Highway Commission. He accepted the job a week later at an annual salary of $2,500. Chief Engineer George Metlen called Kyle "a structural steel designer of many years successful experience both in designing and building steel and concrete structures." Kyle was responsible for standardizing timber, steel, and concrete bridge designs for the commission from 1915 to 1917. He also attended many of the contract letting meetings in the counties, and oversaw the bidding process. In 1916, he became Chief Bridge Designer when Metlen the highway commission demoted Metlen to Bridge Engineer. When he was finally sacked in 1918, Kyle resumed his position as Bridge Engineer. Kyle continued his employment with the highway commission until 1919 when left to seek other business opportunities in Boise, Idaho. Kyle died in Idaho in January 1936. State Highway Commission Meeting Minutes, book 1, pp. 70, 71, 72, 124-125, 178; Metlen, *Report of the Montana State Highway Commission*, 5-8; US Census Records, 1880, 1900-1930, Montana Historical Society, Helena.

[9] The highway commission also used timber stringers for approach spans to steel truss bridges. Montana State Highway Commission Meeting Minutes, book 1, p. 93; "Bridge Building in Montana," *Dillon Examiner* (15 December 1915); Metlen, *Report of the Montana State Highway Commission*, 5, 8, 10; *Second Biennial Report State Highway Commission of Montana, 1919-1920*, (Helena: State Highway Commission, 1920), 63-65; Axline, Monuments Above the Water, 27.

The 1920s marked a transitional period in the construction of bridges in Montana. Changes in the organization and funding of the Federal Aid highway system by Congress in 1922 and 1926 had a profound effect on Montana, the State Highway Commission, and the counties. Most notably was the formation of the Montana Highway Department in 1919. Prior to then, all activities occurred under the aegis of the highway commission, known collectively as the State Highway Commission. With the creation of the department, however, the highway commission became responsible for the political agenda of road and bridge building as well as awarding contracts, managing the department's budget, setting policies, and coordinating with the federal Bureau of Public Roads (BPR). The highway department was responsible for the actual design, construction, and maintenance work on Montana highways. The department operated under the direction of the Chief Engineer, who supervised other department heads, including the bridge department. The Chief Engineer was responsible for ensuring that the highway department carried out the program set by the highway commissioners. The commission's and highway department's relationship with the BPR also became more formalized in the Twenties. The BPR channeled federal funds to the state, approved all projects scheduled by the department, and had the final approval of plans developed by the state's bridge department. The process of road and bridge building in Montana became much more bureaucratically structured in the 1920s as the federal government channeled more money into the state for that purpose.[10]

The Federal Aid Act of 1921 and its 1922 amendment more than doubled the federal allocation for road and bridge construction in Montana. Although the commission used most of the money for road improvements, a substantial amount found its way into the highway department's bridge budget. Prior to 1926, the counties were responsible of the construction of roads and bridges within their jurisdictions. Increasingly during the 1920s, however, the state gained gradual control of highway and bridge construction in Montana by reducing the amount of matching funds needed by the counties. The counties were nominally the lead in the process, but it was the highway commission that controlled the purse strings. In 1926, the commission assumed control of the entire preconstruction and construction process – including payment for the project with federal and state funds. The counties still provided partial funding of bridges, but the commission through the highway department managed the contracts with the builders and decided the location of the bridges.

The 1920s was a decade of tremendous expansion for Montana's highway system. By 1928, the highway commission improved over twenty percent of the state's 4,673 miles by straightening dangerous alignments, grading, improving drainage, installing guardrails, and surfacing dirt roads with gravel, scoria, asphalt, and, occasionally, concrete. It also constructed nearly 400 bridges. Even with the improvements, Montana's roads had a reputation for being truly abysmal. Westerns author Hoffman Birney complained in 1930 that Montana's roads were the "poorest of any state in the Union. Even the glorious scenery of the Rockies can't entirely make up for ruts, chug-holes, mud, and detours to say nothing of broken springs or stone-bruised tires."[11] Sturdy, resilient, and less prone to wash-outs than in the past, bridges fared much better than the roads. Many of the bridges built by the highway department in the 1920s were still in use on the state's highway system at the beginning of the 21st century.

As the highway department's programs expanded during the 1920s, so, too did the number of bridges built by it on the state's roadways. The department initially concentrated on large steel truss bridges on the state's primary highways. But, after 1925, it focused on smaller structures that replaced aging county bridges or were on new alignments. In September 1927, the highway commissioners approved new specifications for timber bridges:

> TIMBER OR LUMBER, unless otherwise specified shall be full sawn Montana larch or Montana [Douglas] fir. It shall be sawed or hewn straight and out of wind with square corners, and shall show at least eighty-five (85) percent heart wood on any girth; and shall be close grained and free from worm holes, unsound or loose knots, knots in clusters, wind shakes, decayed, or unsound portions, or any other defects whatever that might impair its strength and durability. All lumber shall be furnished rough unless otherwise directed. When surfaced lumber is ordered, it shall not be more than one-quarter (1/4) inch under the rough size allowed for each surface dressed, and shall be uniform in thickness.

[10] Steere, *History of the Montana State Highway Department*, 19-21, 23.

[11] Hoffman Birney, *Roads to Roam*, (Philadelphia: Penn Publishing, 1930),162.

The specifications also included provisions for the treatment of the timber components with creosote to make them more long-lasting. Indeed, the low humidity and dry air that typified much of Montana helped preserve the bridges as much as the creosote.[12]

Beginning in 1925, timber stringer bridges exceeded the number of steel truss, reinforced concrete, and steel stringer bridges built on the state's highways. This trend continued until the late 1950s at the onset of the Interstate highway era. Between 1925 and 1930, the department built 412 bridges, of which 306 were timber; the number peaked in 1929 when the department built 103 timber bridges, mostly on primary highways in eastern Montana.

While 1929 marked the peak in timber stringer bridge construction during the Twenties, the Great Depression marked a period of consolidation as economic calamity forced the Montana and federal governments to improve the system through emergency make-work projects. The construction materials remained the same, but many of the designs were modified and simplified to make them easier to construct and less expensive to build. The basic timber bridge design, however, would not change during the decade. Timber stringer bridges fit perfectly with the relief programs of the 1930s – they were spare in appearance and functional in design. Because of the simplicity and relative ease of assembly, they were perfect for the federal government's make-work programs of the Great Depression.

The Great Depression, 1931-1941

The Great Depression devastated Montana. Drought and declining prices for agricultural goods, copper, timber, and oil put thousands of Montanans out of work and their families in desperate need of relief. Ironically, hard times contributed to the transformation of Montana's transportation system from one of the worst in the United States to one of the nation's best in less than a decade. President Franklin Delano Roosevelt's New Deal programs put unemployed Montanans to work on a variety of public works projects, including improvement or construction of the state's roads and bridges. The transformation, however, was not always easy as federal and state governments struggled to work out the details of the funding formulas, strict employment guidelines, and set priorities for the road and bridge building programs.

During the Great Depression, the Montana Highway Department built nearly 3,000 miles of road and 1,145 bridges, many of which still survive on the state's two lane roads. The federal government believed that one of the paths to economic recovery was highway projects. Only about seventeen percent of the bridges built by the department during the 1930s were reinforced concrete, steel truss, and girder bridges. Most were inexpensive timber stringer structures designed to span the countless creeks and dry coulees in eastern Montana. They also met the intent of the federal government's economic relief programs: they required large numbers of laborers. While not structurally distinctive, timber bridges played a vital role in the state's economic recovery by putting hundreds of unemployed men back to work.

From 1931 to 1941, the highway department built nearly a thousand timber bridges, mostly in eastern Montana, in conjunction with highway improvement projects. The design of the bridges changed little since 1915 and deviated little from bridge to bridge. Components of the bridges were obtained from the Pacific Northwest forests because engineers determined that trees grown in the wetter climate of western Washington and Oregon were better suited to Montana's semi-arid climate than those harvested in the state. Treatment plants in Seattle, Tacoma, Portland, and Spokane treated the bridge components with creosote as a preservative before shipping them to Montana. Simple in design and inexpensive, they were ideal for bridging coulees and small streams in eastern Montana. Timber bridges cost about $2,119 per structure. By the mid-1930s, the federal government and State Highway Commission's goal was to build more inexpensive bridges in order to put more people to work.[13]

Before the onset of the Great Depression, federal law stipulated the state match the federal funds provided to Montana. The state raised the funds primarily through taxes on gasoline sold in the state. After 1930, however, the state lacked the revenue necessary to match the federal funds. Beginning in 1930, the federal government funded Montana's bridge program through a series of emergency relief acts. The legislation, simply stated, provided Montana with its federal funding allocation without the matching money from the state. Instead, the federal government planned to withhold portions of the state's future allocations until the amount was paid off. Funding provided by the U.S. government by the

[12] Montana State Highway Commission Meeting Minutes, Book 3, 213-214 (September 22, 1927).

[13] Axline, *Conveniences Sorely Needed*, 84, 85.

Hoover Administration, however, was quite a bit different than during Roosevelt's New Deal a few years later. In December, 1930, the Administration pushed through its first Federal Road Relief Act. It allocated $1.67 million to Montana for road and bridge projects. In early 1931, the state legislature enacted the first of several debentures to supplement the federal money.[14]

Importantly, Hoover's federal relief legislation placed restrictions on the money in order to provide the maximum amount of employment and, therefore, ease the states' unemployment problems. Specifically, Congress stipulated that the contractors hire local workers, maintain maximum thirty hour work weeks, and that only a minimal amount of machinery be used on road and bridge projects to ensure the need for manual labor in quantity. The State Highway Commissioners warned that any contractor who not complying with the employment provisions would be disqualified from bidding on future contracts. The system worked well enough that the Roosevelt Administration continued the employment policies in its New Deal programs.[15]

Within three months of his inauguration in March 1933, President Franklin Roosevelt pushed through legislation creating the National Industrial Recovery Act (NIRA). Title II of the Act created the Public Works Administration (PWA), which distributed the $400 million allocated to the states for public works projects, including roads and bridges. Montana received nearly $7.5 million from the PWA specifically for road and bridge construction. The PWA initiated the greatest boom in road and bridge construction yet seen in Montana. By the time the U.S. Supreme Court declared the NIRA unconstitutional in May 1935, the Montana Highway Department had overseen the construction of 228 bridges. Prior federal legislation funded projects only on the state's primary highway system. The NIRA's road and bridge program, however, signaled the first real federal effort to integrate a system of primary highways, secondary farm-to-market roads, and urban routes into a national transportation system.

The NIRA continued many of the policies first used under Hoover's Emergency Relief Act. Primarily, NIRA specified thirty hour work weeks, minimal use of heavy equipment, strict wage scales for skilled and unskilled labor, and, importantly, the hiring of as much local labor as possible. NIRA also mandated that labor be obtained through district National Reemployment Service offices and that the contractors keep detailed records of wages paid, number of men employed, and hours worked. NIRA's intent was to put as many men to work on public works projects as possible. Oftentimes, however, the contractors misunderstood the employment regulations or just ignored them. The wages required under the Act were often lower than the wage rates previously negotiated by the labor unions, which led to protests before the highway commissioners by union representatives and an occasional strike. Despite the increased paperwork and the lower wages, contractors rarely had problems obtaining labor on road and bridge projects.[16]

In May, 1935, the U.S. Supreme Court declared most provisions of the National Industrial Recovery Act of 1933 unconstitutional. Consequently, the Roosevelt Administration folded parts of the Public Works Administration into other federal agencies and created new ones, including the Works Progress Administration. Under the auspices of the WPA regulations (which were virtually the same as those of the PWA), the state highway commission authorized the construction of 502 timber, steel, and reinforced concrete bridges between May 1935 and December 1941.[17]

Between January 1931 and December 1941, the Montana Highway Department built 1,145 bridges on the state's primary and secondary roads. Of those, 948, or 83 percent, were timber stringer bridges. The peak years for timber bridge construction in the state were 1932 (200), 1931 (134), and 1933 (98). Throughout that ten year period, however, the number of timber stringer bridges built in any given year far outnumbered the quantity of steel truss, reinforced concrete, and steel stringer bridges constructed in the state. Most of the timber stringer bridges were constructed in eastern Montana where the drier climate functioned as a natural preservative that augmented the creosote-treated structural components. Indeed, the majority of Great Depression-era timber stringer bridges that still serve on the state's highways are in eastern Montana. Like the steel truss bridges, there were contractors in the state that specialized in the

[14] Malone, Roeder, and Lang, *Montana*, 296; Steere, *History of the Montana Highway Department*, 28.

[15] Steere, *Ibid*, 28-29; Montana State Highway Commission Meeting Minutes, Book 4, pp. 413, 447.

[16] "New Highway Era," *Engineering News- Record*, 19 January 1934.

[17] T. H. Watkins, *The Great Depression: America in the 1930s*, (Boston: Little, Brown and Co., 1993), 241.

construction of timber stringer bridges. The Walter Mackin Company of Billings built 116 timber bridges, while L. V. Lockwood of Glasgow built 45 of them. Most of the contractors who specialized in timber bridge construction lived in eastern Montana.

As the 1930s drew to a close and war appeared unavoidable, the Bureau of Public Roads redirected the priorities of the state highway commissioners and the department engineers. Increasingly, discussions in commission meetings concentrated on the integration of Montana's roads and bridges into a national military strategic highway network. Primary highways, like U.S. Highways 10 and 91, best served the nation's interests in the event of a national emergency because of their connections to strategically important places in Montana and their interstate connections. Secondary roads functioned primarily as farm-to-market routes and were not as critical to the defense system. The BPR and state highway commission established three categories of strategically important defense highways in April, 1941. The First Priority highways included U.S. Highway 10 (the main east-west highway in the state supplanted by Interstates 90 and 94) and Highway 91, which today parallels Interstate 15. These two highways, along with U.S. 87 between the Wyoming border and Billings, provided the necessary interstate connections and linked Butte, Anaconda, Helena, Great Falls, Billings, and the strategically important chrome mines in Stillwater County to the system. Second and Third Priority roads provided connections to important railroad centers and less important manufacturing and mining centers in Montana.[18]

The strategic highway system had a profound impact on Montana's bridge program. Because of the redirection of steel and oil supplies to military industries, the Public Roads Administration (PRA—formerly the Bureau of Public Roads) and the state highway commission prioritized its construction schedule to best meet the needs of the strategic highway system. The War Department deemed projects on First Priority highways as critical to national defense and directed that limited supplies of steel be utilized on those roads first. The highway commission and PRA then prioritized projects on the secondary system based on their proximity to strategically important main roads. As a result, it took years for the contractors to complete some bridge projects because they could not get the necessary building materials. Discussions between the commissioners and the highway department's engineers involved the modifications of existing roads and bridges to carry heavy military loads and debate on whether to post guards at important highway bridges in the event the United States got involved in the war.[19]

The Japanese attack on Pearl Harbor and Nazi Germany's declaration of war against the United States ended the bridge-building boom, which had transformed Montana's transportation landscape. The Public Roads Administration, state highway commission, and the highway department built well over 1,100 bridges of all shapes, sizes, and types between 1931 and 1941. Bridges built in the counties on what would later become Federal Aid highways and "feeder" roads in the late nineteenth and early twentieth centuries were replaced by the department in an effort to modernize the state's roads. Much of the program was intended to make Montana's highways safer by providing sturdy and reliable timber, steel, and reinforced concrete bridges.

World War II to the Interstate Highway Era, 1942-1960

From replacing deteriorated county bridges in the 1920s to expanding Montana's infrastructure during the Great Depression, the Montana Highway Department struggled to keep up with the demands placed on it by county, state, and federal agencies. World War II brought a brief respite due to material shortages and the federal government's focus on the war effort. Beginning in 1948, however, road and bridge building boomed again as the post-war economic boom, commercial trucking, recreational tourism, and the Cold War created need for improved roads and bridges. The Cold War drove much of the economic expansion as the federal government reacted to its new role as the avatar of democracy in the world. The Cold War manifested itself domestically in a variety of ways, including increased defense spending for improvement of the country's transportation infrastructure, which culminated in the Federal Aid Highway Act of 1956, which created the Interstate highway system.

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[18] Montana State Highway Commission Meeting Minutes, book 8, pp. 242-243, 298-299.

[19] Steere, *History of the Montana State Highway Department*, 38-39; Montana State Highway Commission Meeting Minutes, book 8, p. 395; Planning Survey Division, *Montana Highway History, 1943-1959*, (Helena: State Highway Commission, 1960), 1-2.

Almost immediately after the United States' entry into World War II in December 1941, the highway commissioners canceled all bridge projects scheduled for construction, but allowed those already underway to be completed. Only those projects essential to the national defense were certified by the War Department. Unless the highway or bridge was located on a Priority One road of the Strategic Highway Network, the Army and Navy would not authorize the expenditure of federal funds. In Montana, only projects on U.S. Highways 10 and 91 fell into that category. The military retained strict control of steel, restricting its use for projects deemed essential to the war effort. As the highway department's demanding program during the Great Depression faded, it encouraged its employees to find work in the war industries, promising them their jobs when the "national emergency" ended.[20]

Although Montana was traversed by three major east-west routes (U.S. Highways 2, 10, and 12), only US 10 connected important commercial, industrial, and population centers in the state. The highway, which was later bypassed by Interstates 90 and 94, linked rail centers and oil refineries in Billings and Laurel to the Butte mines, Anaconda smelter, and the sawmills around Missoula to the west coast. By contrast, Highways 2 and 12 passed through sparsely populated agricultural centers. The main north-south route in the state, U.S. Highway 91 provided a connection between Salt Lake City and the Canadian border that included Butte, Helena, and Great Falls. Because the War Department determined U.S. Highways 10 and 91 critical to the national defense, the highway commission allocated more money to road and bridge projects on those routes than it did to other roads during the war years.

The Montana Highway Department concentrated most of its bridge work during the war on U.S. Highway 10 and secondary highways in Stillwater County. Chrome mines critical to the war effort were located in the Beartooth Mountains south of Columbus off Highway 10, the only known source of the ore in the United States. Industries utilized chrome for airplane frames and other war materiel. The aging bridges in the lower Stillwater River valley failed to meet federal standards for loading, roadway widths, or overhead clearances. In May 1942, the highway commissioners let a contract to build a timber through truss span across the Yellowstone River at Columbus. Built of wood because of shortages in steel caused by the war effort, the new bridge replaced an aging steel truss that could not handle the demands placed on it by the increased truck traffic between the chrome mines and U.S. Highway 10. Other priority projects related to the mines in 1942 and 1943 included timber bridges on Secondary Highway 420 in Stillwater County between Absarokee and the Mouat and Benbow chrome mines.[21]

During the 1950s, Montana's highway system underwent a profound change as demands caused by the trucking industry, the cold war, and the public's motoring habits forced the highway department to reassess its priorities. Increasingly during this period the department concentrated more on steel stringer and steel girder bridges and built fewer timber bridges. The department constructed 211 timber bridges between 1945 and 1960; the years of 1947-1949 resulted in the construction of 94 timber bridges. For the most part, timber bridge construction occurred on secondary highways, while the primary highways received steel structures that could handle heavier loads and were more permanent. The design of the bridges had not changed significantly since 1915 with the exception of additional stringers to accommodate wider highways and heavier loads.[22]

President Dwight Eisenhower signed the 1956 Federal Aid Road Act into law, creating the Interstate Highway System, the greatest public works project in world history. The highway commission and highway department spent the first years of the project planning the route and construction of the Interstates. The Interstate Program caused a significant change in how the department did business and its priorities. The sheer magnitude of the program meant that the Montana engineers had to adopt new building materials, specifically prestressed concrete, which was also durable and relatively inexpensive. The material was ideally suited for streamlining bridge designs as necessitated by the program. Eventually prestressed concrete bridges supplanted timber stringer structures on the state's primary and secondary roads. Unfortunately, prestressed concrete also represented the blandness of the interstates as virtually no variation occurred in design and appearance between the structures. Coinciding with the Interstate highway era, the number of timber stringer

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[20] Steere, *History of the Montana Highway Department*, 103.

[21] Montana State Highway Commission Meeting Minutes, book 8, pp. 427, 437.

[22] Standardized timber bridge designs in 1915 included 12 stringers. By 1958, the number of stringers included on timber bridges was 15. Axline, *Monuments Above the Water*, 26-27.

bridges built on Montana's primary and secondary roads significantly diminished beginning in 1957. In 1960, the highway department built only one timber bridge.[23]

Timber bridges are ubiquitous to the Montana landscape and integral to the history of Montana and the Montana Highway Department. Unlike many other states, which relied on steel stringer and reinforced concrete bridges to expeditiously span obstacles, the highway department constructed hundreds of timber bridges to economically and efficiently cross barriers from 1915 until 1960. Simple in design, they were easy to construct, inexpensive, and could be built in large numbers. The number of timber bridges built on Montana's primary and secondary highways peaked between 1930 and 1935, which coincided with the highway department's increased programs during the Great Depression. While timber bridges were constructed after World War II, their use was limited to secondary highways. Eventually they were supplanted by steel stringer and prestressed concrete structures. Timber bridges, however, still exist in large numbers in eastern Montana and are a testament to the Montana Highway Department's early road-building efforts.

Glossary

Abutment: A concrete or wood structure used to support the ends of bridges and to transfer traffic off the deck of the bridge.

Beam: A generic term for a variety of horizontal structural components. Beams can be constructed of wood, metal, concrete, or combinations of these materials. They may be solid, flat, I-shaped, T-shaped, latticed, or boxed.

Bent: A bent is a structural member or framework used for strengthening a bridge or trestle. Bents function in the same capacity as a pier.

Deck: The horizontal surface that stretches from abutment to abutment of a bridge. Traffic and utility loads are placed on the deck. In modern bridges, most decks are concrete. The deck also provides stiffness for the bridge by connecting support beams and trusses.

Guard Rails: Metal, concrete or wood panels on the side of bridges that serve to prevent traffic from leaving the bridge mid-span.

King Post: The simplest truss bridge formed by a triangle. Variations have central posts.

Pier: A mid-span bridge support. Piers transfer bridge loads from the spans to the ground. Piers can be either solid walls or multiple columns. Piers can be constructed of a variety of materials including concrete, metal or wood.

Pier Cap: A transverse member connecting the top of pier columns or the top of a wall pier. In beam bridges it supports the stringers of the bridge.

Piling: A metal or wood pole that is driven into relatively soft sediments to provide support for bridges, either mid-span or in the abutments.

Piling cap. A transverse member connecting a linear series of pilings. In addition to providing a support for bridge stringers, the cap also compensates for any irregularities in the tops of the piling produced by the driving of the pilings.

Queen Post: A longer version of the King Post Truss bridge with a truncated peak replaced by a top cord.

Stringers: As series of parallel beams supporting the deck of a bridge. These beams run lengthwise to the bridge and are supported by abutments and / or center supports. The terms "Stringer", "Beam" and "Girder" are often used interchangeably in the literature. However, stringers usually directly support the deck while girders are often employed transversely to support or connect the stringers. Both are composed of beams (see above).

[23] Tom Lewis, *Divided Highway: Building the Interstate Highways, Transforming American Life*, (New York: Viking Press, 1997), ix; David Plowden, *Bridges: The Spans of North America*, (New York: Viking Press, 1974), 321.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Name of Property Montana
County and State Montana's Historic Timber Stringer Bridges
Name of multiple listing (if applicable)

Section number F Page 1

F. ASSOCIATED PROPERTY TYPES

A. Introduction: Bridges and the National Register Evaluation Criteria[24]

This documentation form examines timber stringer bridges constructed in Montana from 1915 to 1960. According to National Register Bulletin No. 15, "How to Apply the National Register Criteria for Evaluation," to be eligible for listing in the National Register of Historic Places, a bridge must be significant in state, local or national history, architecture, engineering or culture, and possess integrity of location, setting, design, material, workmanship, feeling, and association. In addition, the bridge must meet one or more of the four National Register Criteria:

A. be associated with events that have made a significant contribution to the broad patterns of our history; or

B. be associated with the lives of persons significant in our past;

C. embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield, information important in prehistory or history.

The specific means by which a bridge may meet each of the National Register Criteria are discussed below.

National Register Criterion A: Under Criterion A, a timber bridge may be eligible for the National Register through its association with historic themes. Applicable areas of significance for bridges as defined in National Register Bulletin No. 16 include:

- Exploration/Settlement: Bridges, especially early bridges, may have been associated in a meaningful way with the settlement or development of a geographically definable area. Larger bridges over major rivers may have significance for their historical associations with regional settlement or development.
- Industry: The design of bridges has been closely associated with the technology and process of producing new materials. Bridges associated with the development and introduction of new materials are important.
- Politics/Government: The construction of bridges has most often been undertaken by governmental bodies – first townships, then counties, and later the state with federal regulations and financial inducements. Bridges may be significant if they represent important patterns in the methods counties awarded contracts or are associated with standardized state designs. Although the Montana State Highway Commission began providing bridges plans to the counties in 1915, it was not until 1926 that all bridge engineering work was taken over by the state. Other important bridges may be associated with federal emergency relief and New Deal programs, such as the Works Progress Administration, during the Great Depression that were intended to create labor intensive jobs.
- Transportation: Every bridge in Montana found eligible for the listing in the National Register of Historic Places is associated with the "broad pattern" of transportation. Bridges may gain additional significance under this theme if they facilitated major passage to or through a region or played an important role in the development of an effective transportation system. Large bridges, especially the costly steel trusses and girder structures, represent major investments on the part of counties to address the public's demand for adequate transportation routes.

National Register Criterion B: Under Criterion B, a bridge may be eligible for the National Register if a historically significant person's importance relates directly to the structure. Since the National Register's guidelines state that properties significant as an important example of an engineer's skill should be nominated under Criterion C, it is rare that a bridge would be found eligible under Criterion B. Because all historic bridges in Montana were constructed from standardized designs or from designs purchased from catalogues, no bridge in the state is eligible for the National Register under Criterion B.

[24] This section of the MPD is adapted from "Historic Highway Bridges of North Dakota" (February 1997). The document was prepared for the North Dakota State Historic Preservation Office by Mark Hufstetler of Renewable Technologies, Inc. of Butte, Montana.

National Register Criterion C: Under Criterion C, a timber bridge may be eligible for the National Register if it embodies "the distinctive characteristics or a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction." The only applicable area of significance for bridges under this criterion from Bulletin 16 is in the category of engineering.

The design and popular use of bridge types has been closely tied to the development of new materials and an understanding of their use. Bridges can provide excellent illustrations of the changes that have occurred in metal, concrete, and timber technologies. Some bridges may be significant as rare examples of a type, either as design experiments or widely accepted types that are no longer common. Other bridges, by their ubiquity, are significant as representative examples of a commonly used type and method of construction. Engineers also added aesthetic details, such as decorative balustrades, to some bridges which increase their significance beyond the pure mathematical application of the science.

National Register Criterion D: Under Criterion D, a timber bridge or its remains may be eligible for the National Register if it can yield important information about bridge technology or construction. The information should be embodied in the bridge or its remains; the mere existence, or former existence of a bridge at a particular location does not constitute sufficient important information. Furthermore, the information should not be available through other sources, such as historical documents or extant bridges. Prior inventories of Montana highway bridges have identified no properties that meet this criterion.

B. Property Types

I. Name of Property Type: Timber Stringer Highway Bridges

II. Description:

This property type includes those bridges constructed of timber, both untreated and treated. Essentially, only one timber bridge design with a few modifications was utilized from 1915 to 1960. The only difference between individual bridges were the substructures, either simple pile bents, trestle-type bents, or concrete piers.

Timber bridges consisted simply of multiple timber stringers resting atop end abutments and either bents or piers. No significant variation in the design existed other than the addition of extra stringers in the 1950s to accommodate changing vehicular loads. All timber bridges included timber decks with either gravel or asphalt overlays, wood curbs with sheet metal-lined scupper drains, and double-coursed wood guardrails mounted on wood posts bolted to the outside stringers.[25] Timber bridges consisted of one to 42 spans (24SA181). Span lengths ranged from 19 to 25 feet in length. The decks were supported by twelve lines of timber stringers from 1915 until the late 1940s and then eighteen lines of stringers until 1960. The substructure consisted of earthen abutments supported by wood backwalls braced with timber pilings. Bents and trestles included four pilings to a span with wood braces. The bents had metal caps. The Montana Highway Department began treating timber bridge components with creosote in 1927. All pre-1927 timber bridges were constructed of untreated timber components.

III. Significance

Within the general guidelines for significance of Montana's timber bridges established in the introduction to the property types section, the following timber bridge specific information is added:

Criterion A: The earliest documented timber bridges constructed in Montana were built by John Mullan in 1860. Mullan's work crews built 47 timber bridges along the St. Regis-De Borgia River from March to June 1860. Mullan's bridge-building efforts in Montana culminated in the construction of a six-span timber bridge over the Blackfoot River near its confluence with the Clark Fork during the winter of 1862-1863. From 1864 to 1915, the counties built hundreds of timber bridges

[25] The Montana Department of Transportation began removing the top rail of the double-rail guardrails in the early 1980s to accommodate wider loads. Consequently, only unaltered bridges, including the guardrails, can be considered eligible for the National Register of Historic Places and included in this MPD.

across Montana. They varied in design from simple stringers placed across the stream or ravine with the ends resting on abutments to more elaborate king and queen post structures. The oldest documented timber bridge remaining in the state crosses a ravine at the head of Reeder's Alley in Helena, Montana (24LC883); it was constructed by Carlo Morelli for the City of Helena in 1893.[26]

Formed by the state legislature in 1913, the Montana State Highway Commission standardized a timber bridge design in 1915. The Commission oversaw the construction of four timber bridges between 1915 and 1917. The exact number of timber bridges built by the Montana Highway Department between 1917 and 1922 is unknown. However, between 1923 and 1941, the commission and the Montana Highway Department built 1,256 timber stringer bridges throughout Montana, fully 80 percent of the 1,576 bridges built during that period.[27] Timber stringer bridges required little skilled labor for their construction compared to reinforced concrete and steel bridges. The components had been cut to the correct specifications when they arrived at the construction site and just required assembly of the components according to the plans. The inexpensive cost of the structures and ease of assembly made them ideal for the make work federal programs of the 1930s. Consequently, timber bridges have important associations with federally-sponsored, labor-intensive work programs, but are uniform in design and appearance.

Criterion C: Timber bridge construction in Montana before the creation of the highway commission in 1913 was restricted to Montana's counties and very few of those bridges survive. After 1915 when the highway commission standardized its first timber bridge designs, timber bridge construction was dominated by the state, which advertized for bids for their construction and awarded the contracts to both in-state and out-of-state contractors. Billings contractor Walter Mackin and Glasgow builder L. V. Lockwood specialized in the construction of timber bridges and obtained most of the timber bridge contracts between 1931 and 1960.

One timber bridge dating to 1928 was selected for inclusion in this document. It is representative of all state-designed timber stringer bridges designed and built in Montana from 1915 to 1960. National Register *Bulletin 15* states that a "structure is eligible as a specimen of its type or period of construction if it is an important example (within its context) of building practices of a particular time in history." In selecting the representative examples of timber stringer bridges, evaluation considered additional characteristics, such as being the oldest example, the longest span, the first of a particular design, or exhibiting decorative details not found in similar bridges. The oldest surviving bridges show the earliest extant use of the technology; the longest spans reflect maximum limits of technology, and the first examples of new designs demonstrate changes in technology and aesthetics. Timber stringer bridges exhibit no decorative details nor are expressions of aesthetic details and design concepts.

IV. Registration Requirements

The period of significance for this property type is from 1893 (the construction date of Montana's oldest known surviving timber bridge) to 1960 (when timber was completely supplanted by steel stringer and prestressed concrete structures). This MPD, however, focuses on timber bridges built between 1915 and 1960 as all exhibit the same design style and structural components. A timber bridge may be eligible for the National Register if it meets one or more of the following criteria.

Criterion A: A timber bridge in Montana may be eligible for the listing in the National Register if it was or is:

1. Built as part of Important Early Transportation Routes.

There are no surviving timber bridges associated with the initial development of the state's road system in the nineteenth century. The remains of timber bridges constructed during this period are occasionally discovered, i.e. the pier foundations for the Scanlan Toll Bridge (24MA0557) in Madison County. The counties constructed timber bridges to

[26] Montana Department of Transportation Bridge Inspection Records. Bridge Bureau, Montana Department of Transportation, Helena, Montana.

[27] From 1916 to 1924, the counties funded new bridge construction in Montana, while the state provided the plans, oversaw the bidding process, and supervised the construction of the structures. Unfortunately, the highway commission meeting minutes during that period were not specific as to the type of bridge that it let to contract. Instead, it generalized them in the numbers built, locations, etc. That reporting system became more specific in the meeting minutes in 1925, where specific type and number of bridges are described in the minute books. Axline, *Conveniences Sorely Needed*, 86.

improve their infrastructures especially after the passage of the Enlarged Homestead Act in 1909 vastly increased the state's population, especially in eastern Montana. These early county-built timber bridges are important to our understanding of the 1909-1918 Homestead Boom as they undoubtedly stimulated the growth of the surrounding rural areas on farm-to-market roads.

2. Any Bridge Associated with the Montana Highway Department's Initial Road-Building Program, 1915-1930

In 1915, the Montana State Highway Commission formed a bridge department, hired a bridge designer, and encouraged the state's counties to follow a prescribed process for advertising, bidding, and building timber, steel truss, steel girder, and concrete bridges in the state. The process was designed to provide efficient, cost-effective bridges to the counties by standardizing the procedure and ensuring the counties got what they paid for. The commission's bridge engineers standardized a timber bridge design in 1915. That basic design was utilized by the Montana Highway Department until 1960 when steel stringer and prestressed concrete bridges superseded them Bridges built under this initial phase immediately following the creation of the state bridge department would be eligible under Criterion A because they are part of a broader program to improve and modernize the state's transportation system.

3. Any Bridge Documented as being Constructed under a Federal Work Relief Program of the Depression Era, 1931 - 1941

During the Great Depression (1931-1941), 1,256 bridges were built under the Hoover Administration's emergency relief programs and during Franklin D. Roosevelt's New Deal. The state process was combined with new federal regulations to maximize labor and provide timber bridges using the most up-to-date bridge technology. The result was the greatest period of road and bridge construction yet seen in Montana (it was surpassed in the 1960s and 1970s by the Interstate Highway program). The highway department built the majority of timber bridges from 1931 to 1935 under both the Hoover Administration's and Franklin Roosevelt's relief programs. Bridges built during this period would be eligible for the National Register under Criterion A for their association with the Great Depression make-work programs in the pre-war years.

4. Timber Bridges Documented as being Constructed on Post-World War II Montana Highways, 1945-1960

The years after World War II and leading to the beginning of the Interstate highway program were among the most active for the Montana Highway Department. Increased federal spending on Federal Aid, urban, and secondary highways increased dramatically as the federal and state government strove to provide a modern transportation infrastructure toserve the needs of rapidly changing traffic demands. The renewed road and bridge-building program was statewide and included the construction of 211 timber bridges between 1945 and 1956. Most of the timber bridges built during this period were located on secondary rural roads. Bridges built during this period would be eligible for the National under Criterion A for their association with the post-WWII economic and building boom.

National Register Criterion C: A concrete bridge in Montana may be eligible for listing in the National Register under Criterion C if it was or is:

1. Bridges Built from Designs Standardized by the Montana Highway Department, 1915-1960. State highway engineers standardized a timber bridge design in 1915 and subsequently built at least 1,465 bridges utilizing that basic design between 1915 and 1960. The peak years for timber bridge construction on the state's primary and secondary highways was 1928-1935, 1939-1941, and 1947-1940. Except for minor modifications to the decks to accommodate heavier live loads and the introduction of creosote as a preservative in 1927, the basic timber bridge design did not significantly change during that 45 year period. Consequently, only by looking at the number of stringers under the deck is it possible to date a timber bridge to an approximate period.

2. The Oldest Bridge in a County (prior to 1915). Bridges with documented dates of construction as the oldest in a county or in an area have local significance.

3. The Oldest Bridge of a Type in Montana. The first timber bridge built or of a particular design have local and statewide significance.

4. The Longest Bridge of a Type in Montana. Few timber bridges exhibit long spans, but there are a few that have multi-spans that would qualify them under this category and have significance.

5. Bridges where all of the structural components are original to the structure. Like most man-made structures, modifications are made to bridges as the demands placed on them change. Substructures can be altered to handle heavier loads, widened to accommodate heavier traffic demands, additional structural components added, and new guardrails replacing original railings or guardwalls.

V. Integrity

In addition to the requirement that a bridge must meet one of more of the National Register criteria to be considered eligible for listing in the National Register, it must also retain integrity. The integrity of each bridge is assessed through the following aspects:

Design: For a bridge in this property type to retain integrity of design, the structural members much be substantially in their original condition, although alterations made during the period of significance (through 1960) may be considered part of the bridge's historic fabric. Since railings are such a key visible component of the design of a timber bridge, the original double-coursed railings must be substantially intact, unless the bridge has important engineering features (e.g. it is a rare example of a structural type or it approaches the engineering limits for its type) that impart significance.

Materials: A timber bridge retains integrity of materials if the structural materials and railings are original to the construction, replacement materials were installed during the period of historic significance, or modern repairs or replacements are the same type as those used during period of significance.

Workmanship: For timber bridges, workmanship is embodied in evidence of the builder's labor and skill in assembling the components according to the plans provided by the Montana Highway Department. Integrity of workmanship is lost if the original construction evidence is covered with later materials or aesthetic details such as the original railings have been removed or substantially altered.

Setting and Location: No known attempts have been made to relocate a timber bridge in Montana. The bridge components are treated with creosote and are considered a hazardous waste material by the State of Montana. Consequently, it is highly unlikely that an historic timber bridge will be offered up for adoption and relocated by the Montana Department of Transportation. Bridge components, moreover, are tailored to a specific site and relocation would require substantial alteration to make it fit its new location, thereby altering the integrity of the structure and compromising its setting and location.

Feeling and Association: These two aspects have equal effect on overall integrity of timber bridges. The integrity of design, materials workmanship, location, and setting also has a direct bearing on the integrity of feeling and association. Integrity of feeling and association of a bridge will be lost if modern materials cover the historic materials, or the railings have been removed or substantially altered.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Name of Property Montana
County and State Montana's Historic Timber Stringer Bridges
Name of multiple listing (if applicable)

Section number G & H Page 1

G. GEOGRAPHICAL DATA

This nomination applies to properties located within the present boundaries of the State of Montana.

H. SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

This Multiple Properties Nomination is a product of four distinct research and field survey projects: the original statewide historic bridge inventory in 1979-1980, a statewide field inventory and context development for Montana's timber stringer highway bridges conducted by the Montana Department of Transportation in 1986 with a report prepared in 1991. Two published works, *Historic Bridges in Montana* (Quivik 1982) and *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956* (Axline 2005) have also been produced that deal with Montana's timber stringer bridges. The field surveys and historic context (2000) culminated in the preparation of this document and one individual National Register nomination that accompanies it. Each of the phases is discussed below.

One timber stringer bridge has previously been listed in the National Register in Montana. The Morelli Bridge (24LC0583) was listed as a contributing component of the Helena Historic District (NR reference # 72000737) in 1972.

1. Field surveys and context development (1979-1980 and 2000)

Montana conducted one of the first state-sponsored historic bridge inventories in the United States beginning in 1979. In addition to recording steel truss, reinforced concrete, and steel girder bridges, the survey also included railroad bridges not under county or state jurisdiction. The field survey along with the background research provided the basis for additional historic bridge surveys conducted by the Montana Department of Transportation (MDT) in 1986 (treated timber bridges), 1999 (reinforced concrete bridges), and 2000 (truss bridges built between 1935 and 1946). Renewable Technologies, Inc. (RTI) of Butte, Montana conducted the 1979-1980 inventory, under contract to the MDT. Frederic Quivik and Gray Fitzsimons conducted the survey; Jet Lowe provided photographs of the bridges. The intensive field survey inventoried 477 historic highway and railroad bridges in the state, and also completed substantial primary and secondary research related to the history of Montana's bridges. That survey provided the basis for subsequent historic bridge surveys conducted in Montana. Primary research included construction files and plans at the MDT for on-system bridges. For off-system structures, RTI conducted research in city halls and county courthouses, specifically in the county commissioner and city council meeting minutes and road books. Secondary research included county histories, J.A.L. Waddell's *Bridge Engineering* (John Wiley & Sons 1916) and Milo Ketchum's *The Design of Highway Bridges* (McGraw-Hill 1912). In addition, to those sources, some bridges display dedication plates that provide the date of construction and the name of the contractor.

The MDT also initiated a bridge inspection program in 1979. The inspections included both on-system bridges administered by the MDT and off-system bridges under the jurisdiction of cities and counties. Because of this inspection program, the MDT was able to provide RTI with a list of bridges built before 1930 and their locations. The resulting field survey conducted by RTI included only those structures inspected by the MDT. In 1982, the MDT and the National Park Service published Quivik's *Historic Bridges in Montana*, a seminal work that was among the first publications in the United States to address historic bridges. The book provided the basis for additional Montana bridge surveys and for this document. It was not until 1985, however, that the MDT submitted a Determination of National Register Eligibility for historic bridges to the Montana State Historic Preservation Office (SHPO). The SHPO concurred in the determination that 77 bridges were eligible for the National Register. The criteria outlined in Section "F" above provided the basis for that first determination of eligibility for historic bridges in 1985.

RTI's historic bridge survey and the 1985 determinations of eligibility provided the basis for the MDT's management of historic bridges for the next twelve years. In 1989, the Montana SHPO, Federal Highway Administration (FHWA), Advisory Council on Historic Preservation (ACHP), and the MDT implemented a programmatic agreement concerning historic roads and bridges. The PA, the first of its kind in the United States, abrogated the MDT's requirement to further inventory historic roads and bridges within the state. Instead, it required the department to complete narrative and technical histories of road and bridge development in the state. Consequently, the MDT produced *Roads to Romance: The Origins and Development of the Road and Trail System in Montana* (Wyss 1992) and *Monuments Above the Water: Montana's*

Historic Highway Bridges (Axline 1993). The agreement also specified that the MDT develop educational programs and an Adopt-A-Bridge Program. The PA remained in effect until supplanted by expanded agreement's in 1997 and 2007.

2. 1986 Timber Bridge Inventory

In 1986, Fred Quivik and GCM Services, under contract to the MDT, researched the inspection files of 908 on- and off-system timber bridges built in Montana between 1893 and 1951. Quivik and GCM evaluated each bridge based on the criteria used for the 1979-1980 historic bridge inventory. The evaluation was based on Criterion C standards. Based on that, they were able to pare the number of potentially National Register of Historic Places-eligible timber bridges to 102 that appeared to be relatively intact. After field investigations of each structure, Quivik and GCM Services reduced the number of bridges potentially eligible to 28 structures. The MDT submitted GCM Services' report to the Montana SHPO in August 1986. SHPO concurred in the Determination of Eligibility for those 28 timber bridges on 19 January 1987 on the condition that the MDT provide additional documentation on four of the bridges included on the list: the Cottonwood Creek Bridge (24CR643) in Custer County, the Dodson South Canal (24PH2666) in Phillips County, a stockpass in Ravalli County (24RA0092), and the Buckingham Coulee Bridge (24TE0044) in Treasure County. That documentation was submitted and accepted by SHPO in 1991.[28]

3. 2007 Programmatic Agreement and publication of *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956.*

In 2007, the Montana SHPO, FHWA, ACHP, and the MDT implemented a new PA that better addressed the management of the state's historic bridges. The document contains provisions for the development of an historic bridge database, the implementation of an historic bridge rehabilitation program, and the development of Multiple Properties Documents for timber, steel truss, reinforced concrete, and steel stringer and girder structures. The Adopt-A-Bridge Program was carried forward in the 2007 PA. Prior to 2007, however, the MDT amended the 1997 PA to better handle historic bridges that could not feasibly be relocated under the Adopt-A-Bridge Program. These included reinforced concrete and substantial steel stringer and steel girder structures. The amendment stipulated that the MDT and Montana Historical Society cooperate in the production and publication of a book on Montana's historic highway bridges. The book built on the groundwork laid by RTI and Frederic Quivik and included additional research in both primary and secondary sources by the author, Jon Axline. The book, *Conveniences Sorely Needed: Montana's Historic Highway Bridges, 1860-1956*, provides an historic context for Montana bridges built between 1860 and 1956 including timber bridges. The Montana Historical Society Press published the book in 2005.

4. National Register of Historic Places nominations (2008)

Stipulation 4(C) of the 2007 Programmatic Agreement states that the MDT will "develop National Register Multiple Property Documents (MPD's) for steel truss, reinforced concrete, steel stringer, girder, and timber bridges in Montana." To complete that stipulation, the MDT re-evaluated the 28 timber bridges determined National Register-eligible in 1986 and those inventoried and evaluated by the MDT constructed between 1951 and 1960. The re-evaluation revealed that nineteen of the bridges have been replaced, four have been altered by the removal of their top guardrails (thereby eliminating the distinctive double rails characteristic of historic timber bridges), and three have been programmed for replacement within the next five years (all have had their top rails removed in the 1980s also). Only the Morelli Bridge (24LC0883) in Lewis and Clark County and the Cottonwood Creek Bridge (24CR0643) in Custer County are still intact; the latter included as a National Register nomination with this Multiple Properties Document. Only one other timber bridge, the Little Boulder River Bridge (24JF0813) in Jefferson County has been determined National Register eligible since 1986. The Little Boulder River Bridge, however, has been programmed for replacement. The Morelli Bridge is located within the boundaries of the Helena Historic District. The Cottonwood Creek Bridge is located on a county-maintained road. It has been photographed and additional research in primary and secondary sources was completed and included in the National Register nomination form.

[28] The Buckingham Coulee Bridge and stockpass in Ravalli County have since been replaced. Research later revealed that the Dodson South Canal Bridge had been significantly modified in the 1950s and would not have met the eligibility standards established by the MDT in 1986. The bridge, however, has also been replaced.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Name of Property Montana
County and State Montana's Historic Timber Stringer Bridges
Name of multiple listing (if applicable)

Section number G & H Page 3

Using the 1979-1980 research materials, supplemented by additional research done between 1986 and 2008, MDT Historian Jon Axline prepared this Multiple Properties form and the individual nomination forms during the Fall of 2010. All products were submitted to the Montana SHPO in October 2010.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Name of Property Montana
County and State Montana's Historic Timber Stringer Bridges
Name of multiple listing (if applicable)

Section number I Page 1

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